In vivo analysis of daily disposable contact lenses wettability

Eduardo Ínsua Pereira; Madalena Lira
Centre of Physics, University of Minho

Introduction: Wettability is an important property of contact lens (CL) materials.
When a lens has a poor wettability tends to dehydrate more and become uncomfortable for the user. Today there are several contact lenses on the market that incorporate moisturizing agents that target the best comfort and the time of wear.
Propose:
The aim of this study was to determine "in vivo" wettability of recent daily disposable CL.
Methods
In this contralateral open trial, 27 subjects (8 males) with mean age of 28.2±7.5 years were randomly fitted with 6 daily disposable CL. The lenses materials used were: Stenfilcon A (Cooper Vision), Delefilcon A (Alcon), Nelfilcon A (Alcon), Narafilcon A (Johnson & Johnson), Nesofilcon A (Bausch & Lomb) and Omafilcon A (Cooper Vision).
Patients were followed over a day of CL wear. The principal measurements were the non-invasive break-up time (NIBUT) and pre-lens non-invasive break-up time (PL-NIBUT) assessed 10 minutes (PL-NIBUT1) and 4.4 ± 0.2 hours (PL-NIBUT2) after CL wear.
The measurements were made with a Tearscope Plus (Keeler Instruments Ltd, Windsor, UK) with a grid in a room temperature of 21.3±2.5°C. Three measurements for each lens were made and the mean values were compared.
Results
It was observed a decrease in PL-NIBUT over contact lens wear period. Although the initial NIBUT values were higher than the average values recorded for PL-NIBUT1 and PL-NIBUT2 for each of the lenses tested, there were no significant differences for NIBUT values ($p = 0.622$), PL-NIBUT1 ($p = 0.624$) and PL-NIBUT2 ($p = 0.631$) between the various materials used.

The eyes fitted with narafilcon A recorded the largest decrease in the PL-NIBUT decreasing from13.99±4.40 s to 7.91±1.56 s over 4.4 hours of wear. This difference was statistically significant ($p = 0.008$). Similar results were obtained for nesofilcon A (13.88±4.99 s to 8.27±1.66 s, $p=0.008$); stenfilcon A (13.36±4.00 s to 9.28±1.70 s, $p=0.027$) and Omafilcon A (12.99±1.71 s to 9.21±2.09 s, $p=0.004$).

Compared to NIBUT values, the nesofilcon A users revealed a greater reduction in PL-NIBUT1 (after 10 minutes of CL wear) (13.88±4.99 s to 9.72±2.12 s, $p = 0.027$) and the same behavior was obtained for Omafilcon A material (12.99±1.71 s to 11.06±2.26 s, $p = 0.003$).

Data analysis also revealed no statistically significant differences in PL-NIBUT for patients fitted with the delefilcon A (11.26±3.9 s to 9.12±1.67 s) ($p = 0.102$) and nelfilcon A (12.77±1.65 s to 9.4±3.81 s) ($p = 0.110$) throughout the period of use of CL.

Conclusion The delefilcon A and nelfilcon A exhibit a greater consistency in the PL-NIBUT values over the 4.4 hours of lenses wear. The incorporation of PVA (polyvinyl alcohol) may have a beneficial effect on the stability of the tear film. However, studies with a larger sample size are needed to confirm these results and to associate with subjective comfort.